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ABSTRACT

Major resources exist that can be used to develop or upgrade programs in community colleges and technical institutes that educate robotics/automated systems technicians. The first category of resources is Economic, Social, and Education Issues. The Office of Technology Assessment (OTA) report, "Automation and the Workplace," presents analyses of dimensions of technological change, occupational change forecasting, and changes in instructional requirements for technology and manufacturing. "Computerized Manufacturing Automation: Employment, Education, and the Workplace," another OTA report, is an analysis of technical, economic, and social issues concerning programmable automation in manufacturing. The category of Programs, Bibliographies, and Newsletters includes "Resources for Automated Manufacturing Technologies Programs" (Doty, 1985), containing resources on organizations, agencies, electronic databases, newsletters, and exemplary technical programs located throughout the nation; Rodenstein's (1984) profiles of eight high technology cluster programs, "1983 North American Director of Robotics Education and Training Institutions"; and the newsletter, "Open Entries," which provides technical educators with an information system for exchange of competency-based curricula. The third category of Centers, Associations, and Private Firms suggests as sources of materials the Vocational Technical Education Consortium of the States; Center for Occupational Research and Development; National Center for Research in Vocational Education; a national clearinghouse for computing curriculum materials at Iona College; Rhino Robotics, Inc.; and Amatrol, Inc. (YLB)

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Robotics/Automated Systems Technicians

by
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A national survey (Doty, 1985) was conducted to locate exempary programs in community colleges and technical institues that educate robotics/automated technicians. Hull and Lovett define such technicians as:

> Robotics/automated systems technicians are technical specialists with broad-based electromechanical skills who are familiar with electronic, mechanical and hydraulic/pneumatic devices. They are usually specialists in computer-aided design, robotics, computer numerical control, or processing equipment and can set up automatic machines that work together as part of a total automated system. In their area of specialization, they can install, set up, troubleshoot, integrate, program, modify, test, operate and repair systems and components. They are field-service, installation or service technicians. They will work either under the supervision of an engineer, as a member of a team or as a supervisor of other technicians. (1984; no page)

As a result of that survey and extensive review of the literature several major resources were found that can be used to develop or upgrade technical programs. The purpose of this report is to inform the reader of these resources. These resources may be roughly divided into Economic, Social and Education Issues; Programs, Bibliographies and Newsletter; and Centers, Associations and Private Firms.

Economic, Social and EducationIssues

The Office of Technology Assessment (1983) examined selected labor, education, and training issues and produced a thorough report titled Automation and the Workplace. Detailed analyses of such topics as dimensions of technological change, occupational change forecasting, labor

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supply, working enviroment, and changes in instrctional requirements for technology and manufacturing are presented. Statistical data and pictorial diagrams to illustrate concepts are integrated throughout the report.

In 1984 the Office of Technology Assessment produced Computerized Manufacturing Automation: Employment, Education, and the Workplace. This publication is the culmination of the OTA's thorough analysis of technical, economic, and social issues concerning programmable automation in manufacturing. "The assessment goes beyond technology descriptions to characterize the industries producing and using programmable automation and to discuss the ramifications of the technologies for industrial structure and competitive conduct. It pays special attention to three labor-related areas: the potential for employment change, effects on the work environment and implications for education and training" (1984, April, p.iii). The two publications by the Office of Technology Assessment are highly recommended for reading to aid in planning future technical programs.

Hunt and Hunt (1983) considered the human resource implications of robotics and concluded that the use of robotics is just another stage in the history of automated production, i.e., evolutionary rather than revolutionary. Their projections up to 1990 include the inference that potential job displacement projections due to robotics have been exaggerated. They discuss the changes in jobs and the significant technical background needed for the emerging positions.

Programs, Bibliographies and Newsletter

Resources for Automated Manufacturing Technologies Programs (Doty, 1985) provides information to assist program planners and curriculum

specialists to update programs and upgrade staff skills. This publication contains resources on organizations, agencies, electronic data bases, newsletters, and exemplary technical programs located throughout the nation. Rodenstein's (1984) voluminous publication contains a profile (detailed description) of eight high technology occupational cluster programs. Each profile contains the name of the program, address, phone number, contact person, degree, and the year the program began. Occupational clusters described in Rodenstein's publication are Laser Technology, Telecommunications, Manufacturing and Servicing Technologies, Computer-Assisted Design, Computer Numerical Control, and Robotics. Some information is given about the development of each program, e.g. role of advisory committees, equipment needed, placement information.

A recent workshop (1983) hosted by W. J. Pratt and presented by the American Vocational Association and the Center for Occupational Research and Development focused on developing high technology vocational programs. Information in this comprehensive publication includes descriptions of successful programs, innovative delivery systems, redesigning curricula, and implementing high technology programs with sub topics such as recent text for high technology, equipment, suppliers, and physics.

The Society of Manufacturing Engineers (SME) published the 1983 North American Directory of Robotics Education and Training Institutions. The Directory lists institutions offering a degree or option in industrial robotics, courses in robotics, and support courses for a robotics program. The Society also produced a career guidance module. The module explains the manufacturing engineering and technology area.

The May/June 1984 edition of Industrial Education focused on robotics featuring programs in community colleges and technical institutes plus providing a Robotics Bibliography for Beginners (p. 28).

An important source of information for the technical educator is the newsletter Open Entries. This is a quarterly publication to provide educators with an information system for exchange of competency based curricula. A subscription is inexpensive.

Centers, Association and Private Firms

The Vocational Technical Education Consortium of the States (VTECS) has produced competency based guides for aviation equipment technician, biomedical equipment technician, calibration/metrology technician, computer aid drafting technician, computer aided numerical control technician, computer service and repair technician, electronics tester, laser system technician, and robotics technician. The Consortium has a program of continuous development of new curricula and revision of curricula.

Hull and Lovett (May 1984) produced a status report for the Center for Occupational Research and Development (CORD) in which they identified the state of the art of curriculum materials and training programs for robotics/automated systems technicians. This report is based on a national survey of 3200 institutions. There were 376 responses; of these 56 institutions had programs ongoing and 17 were developing new programs. One hundred fourteen institutions offer robotics courses. There are 27 competency-based, modular texts available that apply to instruction for robotics/automated systems technician training. Contact CORD for the Education Materials Catalog which lists the technical curricula available.

Hull and Lovett (1984) also wrote a paper describing a national model for training robotics/automated systems technicians that provides definitions of terms and schematic diagrams to explain the changes in the technical mix required in modern manufacturing and post secondary level high technology curriculum.

Rehg, Director of the Robotics Resource Center and Department Head of Automated Manufacturing Technology at Piedmont Technical College, North Carolina, completed two publications, The guidelines for robotics program development and Introduction to robotics: a systems approach. Piedmont Technical College is developing a two year, competency based program titled Automated Maunufacturing Technology. The College is one of six centers in South Carolina offering associate degree programs in robotics, microelectronics, computers, and advanced machine technology.

The National Center for Research in Vocational Education has produced a series of publications concerning high technology, e.g., Preparing for High Technology CAD/CAM Programs, Preparing for High Technology: 30 Steps to Implementation, Preparing for High Technology: Strategies for Change. The National Center dissemination office should be contacted for a complete listing of these resources. The American Vocational Association has advertised the availability of over forty five high technology instructional materials. Examples of these materials are Laser/Electro Program Computer Technology Curriculum, Chemistry for Technicians, Nuclear Instrumentation and Control Technician, Fluid Power Systems, etc.

Iona College in Rochelle, New York, has established a national clearinghouse for computing curriculum materials. This is a cooperative effort with the National Association for Educational Computing.

Private firms are rapidly producing software and hardware for robotics such as Rhino Robotics, Inc. Also a series of books/modules (Perkins, 1983) is available from Amatrol, Inc. that are competency based.

Summary

The reader should now realize that there are many resources readily available. These resources should be used to reduce cost in time, money, and frustration.

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Vocational-Technical Education Consortium of States (V-TECS), Southern Association of Colleges and Schools, 795 Peachtree Street, N.E. Atlanta, Georgia 30365, (404)897-6158.